Extra practise if needed

1. $x^2 + 4x + 3 =$?
2. $x^2 - 8x + 7 =$?
3. $x^2 + 2x - 8 =$?
4. $x^2 + 16x - 36 =$?
5. $y^2 - y - 56 =$?
6. $z^2 + 3z - 54 =$?
7. $z^2 - 3z - 54 =$?
8. $z^2 + 15z + 54 =$?
9. $x^2 + 4x + 4 =$?
10. $x^2 - 14x + 49 =$?
11. $x^2 + 10x - 39 =$?

12. $x^2 + 4x + 4 =$?
13. $x^2 - 17x + 66 =$?
14. $a^2 - 2a - 63 =$?
15. $y^2 - 10y + 25 =$?

Killers

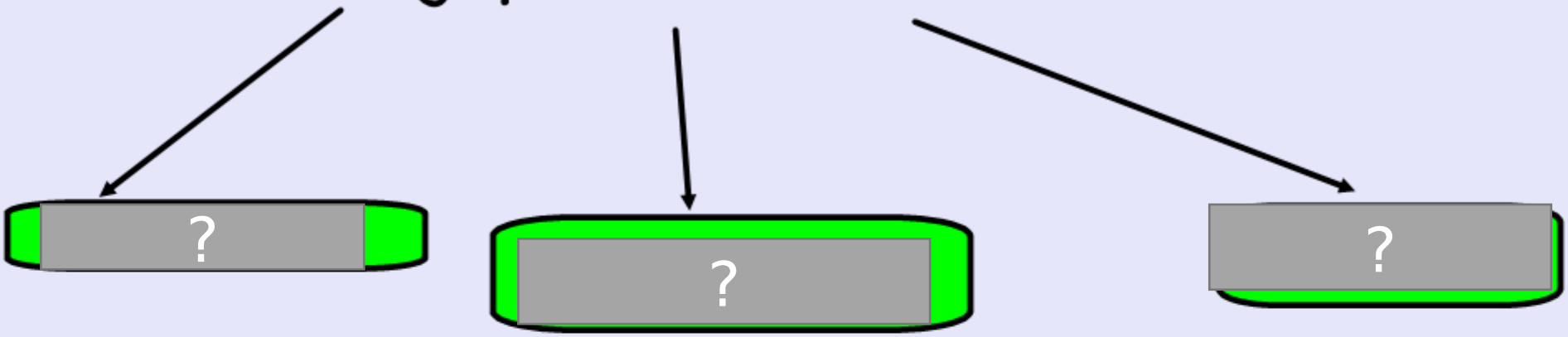
☠ 3

- $x^4 + 5x^2 + 4 =$?
- $x^2 - 2ax + a^2 =$?
- $x^4 - 6abx^2 + 9a^2b^2 =$?

☠ 5

- $x^9 - x^8 - 2x^7 =$?
- $x^{11} + 2x^9 + x^7 =$?

Factorising quadratics – three cases



Why are there such differences?

$3x^2 + 4x$	$x^2 + 5x - 6$	$x^2 - 25$
$12x^2 + 4x$	$x^2 + 6x - 4$	$16x^2 - 4$
$x^2 - 3x$	$6x^2 - 3x + 3$	$49x^2 - 1$

TYPE 3: Difference of two squares

Firstly, what is the square root of:

$\sqrt{4x^2} =$?

$\sqrt{25y^2} =$?

$\sqrt{16x^2y^2} =$?

$\sqrt{x^4y^4} =$?

$\sqrt{9(z-6)^2} =$?

TYPE 3: Difference of two squares

We have '**the difference of two squares**' when, unsurprisingly, we have two 'square' terms, and the **difference** between them!

$$4x^2 - 9^3$$

Always start with two brackets, one with a +, one with a –

$$= (\quad + \quad)(\quad - \quad)$$

Click to Start animation

D.O.T.S - difference of two squares

$x^2 - 25$

$x^2 - 4$

$x^2 - 49$

$x^2 + 0x - 25$

$x^2 + 0x - 4$

$x^2 + 0x - 49$

Quickfire Examples

$1 - x^2 =$?

$y^2 - 16 =$?

$x^2y^2 - 9a^2 =$?

$25 - p^2 =$?

$4x^2 - 9y^2 =$?

Note that order matters. $(1 - x)$ is not the same as $(x - 1)$

Test Your Understanding

Factorise:

$x^2 - 36 =$?

$y^2 - 49 =$?

$4 - 9x^2 =$?

$1 - 4p^2q^2 =$?

Question 1: Factorise each of the following

(a) $x^2 - 25$ (b) $y^2 - 49$ (c) $w^2 - 100$ (d) $x^2 - 4$

(e) $c^2 - 64$ (f) $x^2 - 1$ (g) $x^2 - 900$ (h) $y^2 - 9$

(i) $16 - x^2$ (j) $1 - y^2$ (k) $81 - x^2$ (l) $144 - h^2$

(m) $x^2 - y^2$ (n) $a^2 - c^2$ (o) $9x^2 - 25$ (p) $4y^2 - 1$

(q) $49x^2 - 16$ (r) $100 - 81x^2$ (s) $9x^2 - 4y^2$ (t) $36a^2 - c^2$

(u) $121w^2 - 196y^2$ (v) $225 - 121y^2$

Question 3: Factorise each of the following

(a) $x^4 - 1$ (b) $y^4 - 16$ (c) $a^4 - 25$ (d) $x^4 - y^4$

(e) $h^2 - p^4$ (f) $16x^4 - 49$ (g) $y^6 - 36$ (h) $x^6 - 64$

(i) $81p^4 - x^6$ (j) $144x^8 - 1$

Question 1

(a) $(x - 5)(x + 5)$

(b) $(y - 7)(y + 7)$

(c) $(w - 10)(w + 10)$

(d) $(x - 2)(x + 2)$

(e) $(c - 8)(c + 8)$

(f) $(x - 1)(x + 1)$

(g) $(x - 30)(x + 30)$

(h) $(y - 3)(y + 3)$

(i) $(4 - x)(4 + x)$

(j) $(1 - y)(1 + y)$

(k) $(9 - x)(9 + x)$

(l) $(12 - h)(12 + h)$

(l) $(12 - h)(12 + h)$

(m) $(x - y)(x + y)$

(n) $(a - c)(a + c)$

(o) $(3x - 5)(3x + 5)$

(p) $(2y - 1)(2y + 1)$

(q) $(7x - 4)(7x + 4)$

(r) $(10 - 9x)(10 + 9x)$

(s) $(3x - 2y)(3x + 2y)$

(t) $(6a - c)(6a + c)$

(u) $(11w - 14y)(11w + 14y)$

(v) $(15 - 11y)(15 + 11y)$

Question 3

(a) $(x^2 - 1)(x^2 + 1)$

(b) $(y^2 - 4)(y^2 + 4)$

(c) $(a^2 - 5)(a^2 + 5)$

(d) $(x^2 - y^2)(x^2 + y^2)$

(e) $(h - p^2)(h + p^2)$

(f) $(4x^2 - 7)(4x^2 + 7)$

(g) $(y^3 - 6)(y^3 + 6)$

(h) $(x^3 - 8)(x^3 + 8)$

(i) $(9p^2 - x^3)(9p^2 + x^3)$

(j) $(12x^4 - 1)(12x^4 + 1)$

Extension

1. $4p^2 - 1 =$?
2. $4 - x^2 =$?
3. $144 - b^2 =$?
4. $9 - 16x^2 =$?
5. $1 - 9p^2q^2 =$?
6. $4x^2 - y^2 =$?
7. $p^6 - 1 =$?
8. $a^{10} - b^2 =$?
9. $9(p+1)^2 - 4p^2$
   $=$?

☠1 $32x^8 - 162$
$=$?

☠2 $(x+1)^2 - (x-1)^2$
$=$
$=$?

☠3 $49 - (1-x)^2$?

☠4 $51^2 - 49^2$
?

☠5 What is the highest power of 2 that is a factor of $127^2 - 1$?
?

Factorising review Noughts and Crosses!
10 mins to fill in your worksheet…then, boys vs girls noughts and crosses.

A1 Factorise: $12x + 4$	**A2** Factorise: $3x - 15$	**A3** Factorise: $x^2 + 4x$	**A4** Factorise: $2x^2 - 5x$
B1 Fully factorise: $2xy + 4x$	**B2** Fully factorise: $3xy - 9y$	**B3** Fully factorise: $4ab - 6abc$	**B4** Fully factorise: $2a^2b + 8ab^2$
C1 Factorise: $x^2 - 36$	**C2** Factorise: $x^2 - 81$	**C3** Factorise: $x^2 - 1$	**C4** Factorise: $x^2 - 9$
D1 Factorise: $x^2 + 3x - 54$	**D2** Factorise: $x^2 + 8x + 7$	**D3** Factorise: $x^2 - 4x - 32$	**D4** Factorise: $x^2 - 8x + 15$

A1 Factorise: $12x + 4$ $4(3x + 1)$	**A2** Factorise: $3x - 15$ $3(x - 5)$	**A3** Factorise: $x^2 + 4x$ $x(x + 4)$	**A4** Factorise: $2x^2 - 5x$ $x(2x - 5)$
B1 Fully factorise: $2xy + 4x$ $2x(y + 2)$	**B2** Fully factorise: $3xy - 9y$ $3y(x - 3)$	**B3** Fully factorise: $4ab - 6abc$ $2ab(2 - 3c)$	**B4** Fully factorise: $2a^2b + 8ab^2$ $2ab(a + 4b)$
C1 Factorise: $x^2 - 36$ $(x + 6)(x - 6)$	**C2** Factorise: $x^2 - 81$ $(x + 9)(x - 9)$	**C3** Factorise: $x^2 - 1$ $(x + 1)(x - 1)$	**C4** Factorise: $x^2 - 9$ $(x + 3)(x - 3)$
D1 Factorise: $x^2 + 3x - 54$ $(x + 9)(x - 6)$	**D2** Factorise: $x^2 + 8x + 7$ $(x + 7)(x + 1)$	**D3** Factorise: $x^2 - 4x - 32$ $(x + 4)(x - 8)$	**D4** Factorise: $x^2 - 8x + 15$ $(x - 3)(x - 5)$

$$x^3 - 5x^2 - 6x$$

Factorise these ful

Hint! Look for the sneaky common factor first!

1. $y^3 + 4y^2 + 3y$

$y(y^2 + 4y + 3)$

$y(y + 3)(y + 1)$

2. $10x^2 + 20x + 10$

$10(x^2 + 2x + 1)$

$10(x + 1)^2$

3. $4y^3 + 20y^2 + 24y$

$4y(y^2 + 5y + 6)$

$4y(y + 2)(y + 3)$

4. $50x^3 - 8x$

$2x(25x^2 - 4)$

$2x(5x + 2)(5x - 2)$